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EXAMINER	
RYMAN, DANIEL J	

ART UNIT	PAPER NUMBER
2665	8

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/610,050	Applicant(s) GUEY ET AL.	
	Examiner Daniel J. Ryman	Art Unit 2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see Amendment A, filed 3/1/2004, with respect to the rejection(s)of claim(s) 1-16 and 18-30 under Secord et al (USPN 6,097,712) and Dent (USPN 6,507,602) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Huang et al (USPN 5,870,378) and Secord et al (USPN 6,097,712).

2. The indicated allowability of claim 17 is withdrawn in view of the newly discovered reference(s) to Liberti, Jr. et al (USPN 5,533,062). Rejections based on the newly cited reference(s) follow.

Information Disclosure Statement

3. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered. The references cited on page 9, lines 7-15 of the specification should be included in an IDS.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-11 and 19-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (USPN 5,870,378) in view of Secord et al (USPN 6,097,712).

6. Regarding claims 1, 19, and 25, Huang discloses a method and receiver for a multi-carrier CDMA system for receiving a signal transmitted on plural sub-carriers each having a known pilot sequence (Wo) (col. 1, lines 61-66 and col. 3, lines 46-63), where the receiver could be in a base station or a mobile terminal (Fig. 1 and col. 4, lines 45-48) and where, as broadly defined, each sub-carrier is associated with (has) a known pilot sequence: a plurality of down-converters down-converting the received signal to different data baseband signals (col. 4, line 45-61); a delay and channel estimator correlating at least one of the different data baseband signals with a single pilot signal (Wo) (Fig. 2, ref. Pilot and 206; col. 1, lines 45-53; col. 3, lines 59-63; col. 5, lines 45-59; col. 8, lines 55-59; and col. 9, lines 18-22), to produce an estimate of channel gain and multi-path delay (col. 1, lines 45-53; col. 5, lines 45-59; col. 8, lines 55-59; and col. 9, lines 18-22); and a plurality of demodulators, one for each of the plural sub-carriers, and operatively coupled to the delay and channel estimator, each demodulating one of the different data baseband signals using the estimate of channel gain and multi-path delay (col. 4, lines 45-61; col. 5, lines 25-59; and col. 8, lines 55-59). Huang does not disclose that the single pilot signal is a single wideband pilot signal, the single wideband pilot signal comprising more than one of the known pilot sequences. Secord teaches, in a multi-carrier CDMA system, a delay and channel estimator correlating at least one of the different data baseband signals with a single pilot signal, the single wideband pilot signal comprising more than one of the known pilot sequences (col. 5, line 4-col. 6, line 65, esp. col. 5, line 63-col. 6, line 21) in order to provide

higher multi-path resolution (col. 6, lines 10-21). It would have been obvious to one of ordinary skill in the art at the time of the invention to have the single pilot signal be a single wideband pilot signal, the single wideband pilot signal comprising more than one of the known pilot sequences in order to provide higher multi-path resolution.

7. Regarding claims 2, 20, and 26, referring to claims 1, 19, and 25, Huang in view of Secord discloses that the plurality of down-converters comprise one for each sub-carrier (Secord: col. 5, line 4-col. 6, line 65).

8. Regarding claims 3, 21, and 27, referring to claims 1, 19, and 25, Huang in view of Secord discloses that the plurality of down-converters comprise a plurality of sub-carrier down-converters, one for each sub-carrier, and a composite down-converter down-converting the received signal to a composite baseband signal (Secord: col. 5, line 4-col. 6, line 65) where the receiver can comprise the arrangements of both the prior art receiver and the inventive receiver such that it comprises a plurality of down-converters, one for each sub-carrier and one for the composite baseband signal.

9. Regarding claims 4, 22, and 28, referring to claims 3, 21, and 27, Huang in view of Secord discloses that the delay and channel estimator is operatively coupled to the composite down converter for correlating the composite baseband signal with a composite of the known pilot sequence to produce an estimate of channel gain and multi-path delay (Secord: col. 5, line 4-col. 6, line 65).

10. Regarding claims 5, 23, and 29, referring to claims 1, 19, and 25, Huang in view of Secord discloses that the delay and channel estimator comprises a plurality of correlators, one for each sub-carrier, and outputs of each of the plurality of correlators are combined to produce the

estimate of channel gain and mufti-path delay (Secord: col. 1, line 59-col. 2, line 18 and col. 5, line 4-col. 6, line 65).

11. Regarding claims 6, 24, and 30, referring to claims 1, 19, and 25, Huang in view of Secord further discloses a plurality of correlators, one for each down-converter, each correlating one of the different data baseband signals with the known pilot sequence for one of the sub-carriers, to produce an estimate of channel gain and mufti-path delay, and wherein the plurality of demodulators selectively demodulate the different data baseband signals using either the estimate of channel gain and multi-path delay produced by the delay and channel estimator or the estimate of channel gain and multi-path delay produced by the plurality of correlators (Secord: col. 5, line 4-col. 6, line 65, esp. col. 6, lines 59-65).

12. Regarding claim 7, Huang discloses a receiver for a multi-carrier CDMA system for receiving a signal transmitted having a known pilot sequence on plural sub-carriers (Wo) (col. 1, lines 61-66 and col. 3, lines 46-63), comprising: down-converters and filters, each down-converting the received signal to baseband and removing the other sub-carriers to provide different data sub-carrier baseband signals (Fig. 4 and col. 4, lines 45-61); a composite down-converter down-converting the received signal to a composite baseband signal (Fig. 4 and col. 4, lines 45-61); a delay and channel estimator operatively coupled to the composite down converter correlating the baseband signal with a known pilot sequence to produce an estimate of channel gain and multi-path delay (col. 1, lines 45-53; col. 5, lines 45-59; col. 8, lines 55-59; and col. 9, lines 18-22); and a plurality of demodulators, each operatively connected to the sub-carrier down-converters and filters and to the delay and channel estimator, each demodulating one of the different data sub-carrier baseband signals using the estimate of channel

gain and multi-path delay (col. 4, lines 45-61; col. 5, lines 25-59; and col. 8, lines 55-59). Huang does not expressly disclose a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide different data sub-carrier baseband signals in addition to a composite down-converter down-converting the received signal to a composite baseband signal. Secord discloses, in a multi-carrier CDMA system, having a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide plural sub-carrier baseband signals (col. 5, line 4-col. 6, line 65); a composite down-converter down-converting the received signal to a composite baseband signal (col. 5, line 4-col. 6, line 65); a delay and channel estimator operatively coupled to the composite down converter to produce an estimate of channel gain and multi-path delay (col. 5, line 4-col. 6, line 65); and a plurality of demodulators, each operatively connected to one of the sub-carrier down-converters and filters and to the delay and channel estimator (col. 2, lines 19-66 and col. 5, line 4-col. 6, line 65) where Secord discloses "at least one demodulator" such that a plurality is obvious, each demodulating one of the plural sub-carrier baseband signals using the estimate of channel gain and multi-path delay (col. 2, lines 19-66 and col. 5, line 4-col. 6, line 65) where demodulating for each sub-carrier is well known in the art as is evidenced by applicant (page 1, lines 17-20) in order to provide higher multi-path resolution (col. 6, lines 10-21). It would have been obvious to one of ordinary skill in the art at the time of the invention to have a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide different data sub-carrier baseband signals in addition to a composite down-converter

down-converting the received signal to a composite baseband signal in order to provide higher multi-path resolution.

13. Regarding claim 8, referring to claim 7, Huang in view of Secord discloses that the composite down converter down-converts the received signal relative to a center carrier frequency and the sub-carriers are separated with respect to the center carrier frequency (Secord: col. 5, line 4-col. 6, line 65).

14. Regarding claim 9, referring to claim 8, Huang in view of Secord discloses that the composite of the known pilot sequence comprises a sum of the known pilot sequences (Secord: col. 5, line 4-col. 6, line 65).

15. Regarding claim 10, referring to claim 7, Huang in view of Secord further discloses a plurality of correlators, one for each down-converter, each correlating one of the different data sub-carrier baseband signals with the known pilot sequence for one of the sub-carriers, to produce an estimate of channel gain and multi-path delay, and wherein the plurality of demodulators selectively demodulate the different data sub-carrier baseband signals using either the estimate of channel gain and multi-path delay produced by the delay and channel estimator or the estimate of channel gain and multi-path delay produced by the plurality of correlators (Huang: col. 1, lines 45-53; col. 5, lines 45-59; col. 8, lines 55-59; and col. 9, lines 18-22 and Secord: col. 5, line 4-col. 6, line 65, esp. col. 6, lines 59-65).

16. Regarding claim 11, Huang discloses a receiver for a multi-carrier CDMA system for receiving a signal transmitted on plural sub-carriers each having a known pilot sequence (Wo) (col. 1, lines 61-66 and col. 3, lines 46-63), comprising: down-converters and filters, each down-converting the received signal to baseband and removing the other sub-carriers to provide

different data sub-carrier baseband signals (Fig. 4 and col. 4, lines 45-61); a delay and channel estimator operative to produce an estimate of channel gain and multi-path delay by correlating a pilot sequence with a known pilot sequence (col. 1, lines 45-53; col. 5, lines 45-59; col. 8, lines 55-59; and col. 9, lines 18-22); and a plurality of demodulators, one for each of the plural sub-carriers and operatively coupled to the delay and channel estimator, each demodulating one of the different data baseband signals using the estimate of channel gain and multi-path delay (col. 4, lines 45-61; col. 5, lines 25-59; and col. 8, lines 55-59). Huang does not expressly disclose a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide different data sub-carrier baseband signals or a delay and channel estimator comprising a plurality of correlators, each correlating one of the different data sub-carrier baseband signals with the known pilot sequence for the one sub-carrier, and operative to combine outputs of the plurality of correlators to produce an estimate of channel gain and multi-path delay. Secord discloses, in a multi-carrier CDMA system, a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide plural sub-carrier baseband signals (col. 5, line 4-col. 6, line 65) and a delay and channel estimator operative to produce an estimate of channel gain and multi-path delay (col. 5, line 4-col. 6, line 65) where the delay and channel estimator operate in a known manner (col. 5, line 4-col. 6, line 65) and where there is one delay and channel estimator for each sub-carrier signal (col. 5, line 4-col. 6, line 65) in order to provide higher multi-path resolution (col. 6, lines 10-21). Thus, Huang in view of Secord suggests a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal

to baseband and removing the other sub-carriers to provide different data sub-carrier baseband signals and a delay and channel estimator comprising a plurality of correlators, each correlating one of the different data sub-carrier baseband signals with the known pilot sequence for the one sub-carrier, and operative to combine outputs of the plurality of correlators to produce an estimate of channel gain and multi-path delay. It would have been obvious to one of ordinary skill in the art at the time of the invention to have a plurality of sub-carrier down-converters and filters, one for each sub-carrier, each down-converting the received signal to baseband and removing the other sub-carriers to provide different data sub-carrier baseband signals and a delay and channel estimator comprising a plurality of correlators, each correlating one of the different data sub-carrier baseband signals with the known pilot sequence for the one sub-carrier, and operative to combine outputs of the plurality of correlators to produce an estimate of channel gain and multi-path delay in order to provide higher multi-path resolution.

17. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (USPN 5,870,378) in view of Secord et al (USPN 6,097,712) as applied to claim 11 above, and further in view of Tiedemann, Jr. et al (USPN 6,335,922).

18. Regarding claim 12, referring to claim 11, Huang in view of Secord does not expressly disclose that the delay and channel estimator identifies multi-paths and relative delays for the multi-paths using threshold comparison. Tiedemann discloses, in a CDMA transmission system, using a threshold comparison to identify multi-paths and relative delays for the multi-paths (col. 29, lines 5-38) where the threshold is used to identify a multi-path where an identified multi-path can be used to identify a relative delay. It would have been obvious to one of ordinary skill in the art at the time of the invention to have the delay and channel estimator identify multi-paths and

relative delays for the multi-paths using threshold comparison since identifying multi-paths using a threshold is known in the art.

19. Claims 13-16, 18, and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (USPN 5,870,378) in view of Secord et al (USPN 6,097,712) in further view of Winters (USPN 5,481,570).

20. Regarding claims 13 and 31, Huang discloses a method of synthesizing a radio channel profile for a multi-carrier CDMA receiver receiving a signal transmitted on plural sub-carriers (col. 1, lines 61-66 and col. 3, lines 46-63), comprising: down-converting the received signal to baseband and removing the other sub-carriers to provide different data sub-carrier baseband signals (Fig. 4 and col. 4, lines 45-61); correlating a baseband signal with a known pilot sequence to provide a correlated different data sub-carrier baseband signal (col. 1, lines 45-53; col. 5, lines 45-59; col. 8, lines 55-59; and col. 9, lines 18-22). Huang does not expressly disclose correlating each of the different data sub-carrier baseband signals with a known pilot sequence to provide correlated different data sub-carrier baseband signals. Secord discloses, in a multi-carrier CDMA system, a delay and channel estimator operative to produce an estimate of channel gain and multi-path delay (col. 5, line 4-col. 6, line 65) where the delay and channel estimator operate in a known manner (col. 5, line 4-col. 6, line 65) and where there is one delay and channel estimator for each sub-carrier signal (col. 5, line 4-col. 6, line 65) in order to provide higher multi-path resolution (col. 6, lines 10-21). Thus, Huang in view of Secord suggests correlating each of the different data sub-carrier baseband signals with a known pilot sequence to provide correlated different data sub-carrier baseband signals. It would have been obvious to one of ordinary skill in the art at the time of the invention to correlate each of the different data

sub-carrier baseband signals with a known pilot sequence to provide correlated different data sub-carrier baseband signals in order to provide higher multi-path resolution. Huang in view of Secord does not expressly disclose sampling each of the correlated different data sub-carrier baseband signals; transforming each of the sampled, correlated different data sub-carrier baseband signals to a discrete frequency domain; combining the transformed baseband signals to produce a combined discrete frequency domain signal; and inverse transforming the combined discrete frequency domain signal to produce a composite correlation output signal. Winters discloses, in a wireless system, combining signals in the frequency domain that were transformed from samples in the time domain because some computations can be simplified if performed in the frequency domain rather than the time domain (col. 2, lines 11-20; col. 3, lines 8-24; and col. 4, lines 25-34). It would have been obvious to one of ordinary skill in the art at the time of the invention to sample each of the correlated sub-carrier baseband signals; transform each of the sampled, correlated sub-carrier baseband signals to a discrete frequency domain; combine the transformed baseband signals to produce a combined discrete frequency domain signal; and inverse transform the combined discrete frequency domain signal to produce a composite correlation output signal since some calculations are simplified in the frequency domain compared to the time domain.

21. Regarding claims 14 and 15, referring to claim 13, Huang in view of Secord in further view of Winters does not expressly disclose that sampling each of the different data correlated sub-carrier baseband signals comprises sampling each of the correlated sub-carrier baseband signals at or above the Nyquist rate; however, Examiner takes official notice that sampling at or

above the Nyquist rate is very old and well known since this results in a sampled signal that is sufficient to characterize the original signal.

22. Regarding claim 16, referring to claim 13, Huang in view of Secord in further view of Winters does not expressly disclose that transforming each of the sampled, different data correlated sub-carrier baseband signals to a discrete frequency domain comprises forming discrete Fourier transforms for each of the sampled, different data correlated sub-carrier baseband signals; however, Examiner takes official notice that performing a DFT on a signal is a very well-known method to transform a time-domain signal to a frequency domain signal.

23. Regarding claim 18, referring to claim 16, Huang in view of Secord in further view of Winters does not expressly disclose that inverse transforming the combined discrete frequency domain signal to produce a composite correlation output signal comprises calculating an inverse discrete Fourier transform for the combined discrete frequency domain signal; however, Examiner takes official notice that performing an IDFT on a signal is a very well-known method to transform a time-domain signal to a frequency domain signal.

24. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al (USPN 5,870,378) in view of Secord et al (USPN 6,097,712) in further view of Winters (USPN 5,481,570) as applied to claim 13 above, and further in view of Liberti, Jr. et al (USPN 5,533,062).

25. Regarding claim 17, referring to claim 13, Huang in view of Secord in further view of Winters does not expressly disclose that combining the transformed baseband signals to produce a combined discrete frequency domain signal comprises computing a carrier frequency offset in frequency domain for each of the sub-carriers and summing the transformed baseband signals

using the carrier frequency offsets in the frequency domain. Liberti discloses, in a wireless communication system, that a frequency offset is useful when manipulating samples in the frequency domain in order to reconstruct the original received signal (col. 1, line 50-col. 2, line 27, esp. col. 2, lines 7-13). Thus, it would have been obvious to one of ordinary skill in the art at the time of the invention to combine the transformed baseband signals to produce a combined discrete frequency domain signal by computing a carrier frequency offset in frequency domain for each of the sub-carriers and summing the transformed baseband signals using the carrier frequency offsets in the frequency domain in order to reconstruct the original received signal.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel J. Ryman whose telephone number is (703)305-6970. The examiner can normally be reached on Mon.-Fri. 7:00-5:00 with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (703)308-6602. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Daniel J. Ryman

STEVEN H.D NGUYEN
PRIMARY EXAMINER

Examiner
Art Unit 2665

Daniel J. Ryman